come airborne in association with particulate matter.

Degradation

SOC can be transformed into a variety of degradation products. These degradation products may themselves degrade. Ultimate degradation, or mineralization, results in the oxidation of organic carbon to carbon dioxide. Major transformation processes include photolysis, hydrolysis, and oxidation-reduction reactions. The latter are commonly mediated by biological systems.

Photolysis refers to the destruction of a compound by the energy of light. The energy of light varies inversely with its wavelength (**Figure 2.28**). Long-wave light lacks sufficient energy to break chemical bonds. Short wave light (x-rays and gamma rays) is very destructive; fortunately for life on earth, this type of radiation largely is removed by our upper atmosphere. Light near the visible spectrum reaches the earth's surface and can break many of the bonds common in SOC. The fate of organic solvents following volatilization is usually photolysis in the earth's atmosphere. Photolysis also can be important in the degradation of SOC in stream water.

Hydrolysis refers to the splitting of an organic molecule by water. Essentially water enters a polar location on a molecule and inserts itself, with an H^+ going to one part of the parent molecule and an OH^- going to the other. The two parts then separate. A group of SOC called esters are particularly vulnerable to degradation by hydrolysis. Many esters have been produced as pesticides or plasticizers.

Oxidation-reduction reactions are what fuels most metabolism in the biosphere. SOC are generally considered as sources of reduced carbon. In such situations, what is needed for degradation is a metabolic system with the appro-

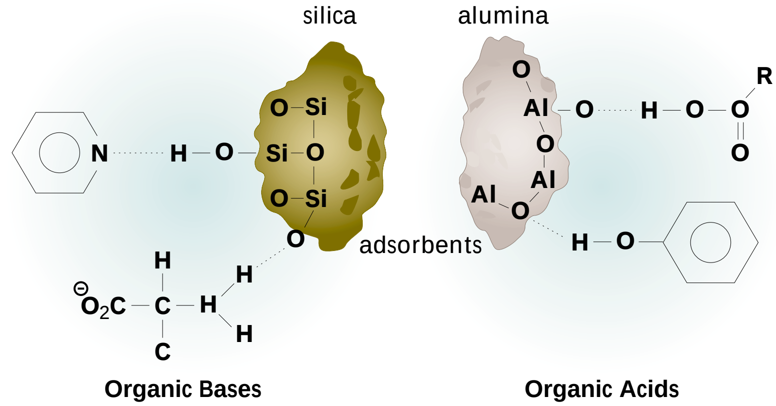

Figure 2.27: Two important types of hydrogen bonding involving natural organic matter and mineral surfaces. *Some contaminants are carried by sediment particles that are sorbed onto their surfaces by chemical bonding.*

Figure 2.28: Energy of electromagnetic radiation compared with some selected bond energies. *Light breaks chemical bonds of some compounds through photolysis.*